second set. The control means is for adapting a transmission on a downlink channel for the user equipment using the determined channel state. By example, the input means may be a radio receiver and the determining means may be one or more processors.

[0014] In a fifth exemplary aspect of the invention there is an apparatus which includes at least one processor and at least one memory including computer program code. The at least one memory and the computer program code are configured, with the at least one processor, to cause the apparatus at least to: create and send correspondence information that relates channel states of a first set to channel states of a second set, where the second set is for a downlink channel; and measure at least one channel state and send an indication of the at least one channel state which is within the first set.

[0015] In a sixth exemplary aspect of the invention there is a method which comprises: creating and sending correspondence information that relates channel states of a first set to channel states of a second set, where the second set is for a downlink channel; and measuring at least one channel state and sending an indication of the at least one channel state which is within the first set.

[0016] In a seventh exemplary aspect of the invention there is a computer readable memory storing a program of instructions which when executed by at least one processor cause an apparatus to perform: creating and sending correspondence information that relates channel states of a first set to channel states of a second set, where the second set is for a downlink channel; and measuring at least one channel state and sending an indication of the at least one channel state which is within the first set.

[0017] In an eighth exemplary aspect of the invention there is an apparatus that comprises processing means and measuring means. The processing means is for creating and sending correspondence information that relates channel states of a first set to channel states of a second set, where the second set is for a downlink channel. The measuring means is for measuring at least one channel state and sending an indication of the at least one channel state which is within the first set. By example, the processing means may be one or more processors, and the measuring means may be that same or a different processor(s) operating in conjunction with measurement data obtained by a radio receiver for measuring a channel.

DETAILED DESCRIPTION

[0018] In conventional LTE, the definition of channel quality information (CQI) is such that it indicates the highest supported transport block size (TBS)/modulation and coding scheme (MCS), assuming that the eNodeB schedules data to the UE using the parameters the UE has reported to it. The UE shall derive for each CQI value reported in uplink subframe n the highest CQI index between 1 and 15 in the predefined CQI table such that the block error rate (BLER) of the physical downlink shared channel (PDSCH) data scheduled by the eNodeB according to the recommended CQI shall not exceed 10%.

[0019] Relevant teachings concerning CSI reporting that may have some relevance to the ePDCCH may be seen in co-owned PCT Application PCT/CN2012/070689 filed on Jan. 20, 2012.

[0020] When the ePDCCH is introduced for the LTE-Advanced system, CSI needed for optimized ePDCCH transmission could be different, and needed at different times, than what is used for the PDSCH in conventional LTE. In LTE-Advanced the PDSCH may be on a different component carrier than the ePDCCH and may be widely spaced in frequency therefrom. Therefore the implicit assumption in conventional LTE that the channel conditions observed by the UE for the PDSCH are sufficiently valid for the PDCCH is not reasonable to simply extend to the ePDCCH.

[0021] One non-limiting solution according to these teachings is shown at FIG. **1** in which the UE provides a proposed mapping of the CQI index for PDSCH which the UE **10** measures and reports an ePDCCH CQI index (which the UE **10** measured but did not explicitly report) so that the CQI index related to PDSCH that the UE reported can be used by the eNodeB for its link adaption concerning the ePDCCH. This mapping can be provided via uplink RRC signaling at the request **108** of the eNodeB **20** as shown in FIG. **1**, or the UE can autonomously trigger this transmission whenever the mapping changes. FIGS. **2**A-C show specific but non-limiting examples of such mapping.

[0022] Specifically, at FIG. **1** the eNodeB **20** first configures **102** the UE for reporting CSI. This configuring may be semi-static, as when **102** is radio resource control (RRC) signaling; or it may be dynamic as when **102** is a PDCCH that has an uplink resource grant for the UE **10**. The eNodeB **20** then sends a downlink reference signal (RS) at **104**. By example this reference signal may be a common reference signal (CRS), or it may be a RS specifically for measuring CSI for this UE (channel state information reference signal, CSI-RS). The UE **10** derives the CSI based on this RS **104** and reports at **106** the CSI for it. When reporting at **106** the UE **10** can report the CQI value, and/or a rank indicator (RI), and/or a precoding matrix indicator (PMI), or some indication of these actual values such as an index. While the UE **10** derives the CSI from the downlink RS, that CSI indicates to the eNodeB **20** the transmission parameters that the PDSCH should support.

[0023] As noted above, the eNodeB **20** may request the UE **10** to provide its mapping, depicted at FIG. **1** at **108**. The UE **10** does so at **110**, and as detailed below with reference to FIGS. **2**A-C the UE **10** need not report the entire tables shown in those figures but may only signal the transitions. If we assume the measured CSI containing CQI on RSs is a first set of channel states, and the CSI that the UE **10** adds in its mapping as a second set of channel states (relevant for the ePDCCH in these examples), then what the UE **10** reports at **110** is correspondence information between the first set of channel states and the second set of channel states.

[0024] The order of the messages at FIG. **1** is not limiting. For example the UE **10** may report its mapping **110** prior to the time it derives and reports the CSI in step **106**. This may save on signaling overhead for embodiments in which the UE **10** only sends a new mapping **110** to the eNodeB **20** when there is a change in the correspondence information between the first and second sets of channel states.

[0025] Then the eNodeB **20** uses that mapping from **110** and the reported (measured) CSI **106** of the first set of channel states (for the RS **104** which is related to the PDSCH) to obtain transmission parameters for the ePDCCH which is in the second set of channel states. This mapping is only suggested and the eNodeB **20** may use a different transmission parameters for the ePDCCH than was suggested in the mapping **110** by the UE **10**, since for example it may receive from other UEs different mappings and decide a CQI for the ePDCCH that is more representative of all the UEs which have reported their suggested mapping. In any case the eNodeB **20**